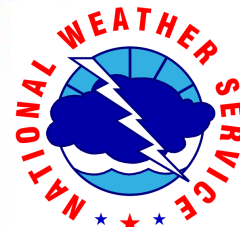


SkyScoop

The Newsletter of the National Weather Service in Wilmington, Ohio

National Oceanic and Atmospheric Administration (NOAA) – US Department of Commerce (DOC)



ISSUE 20

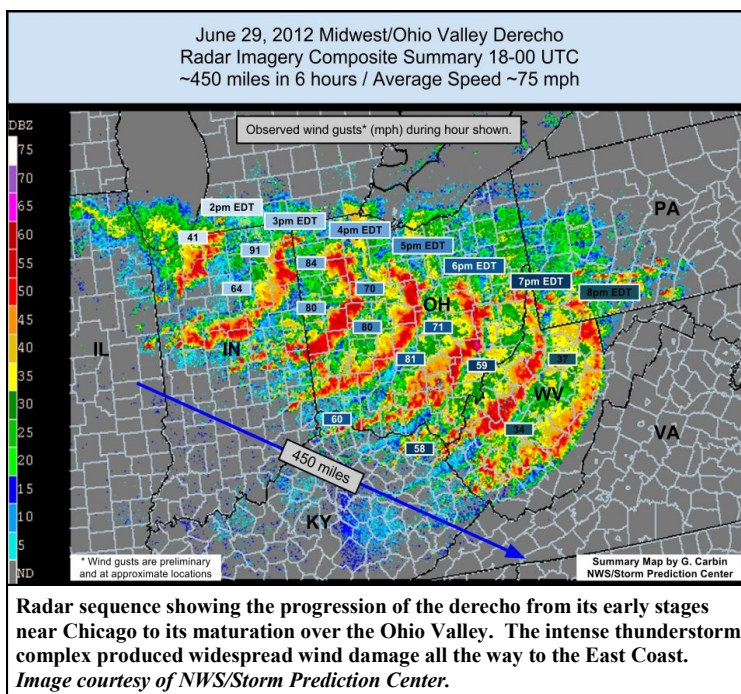
FALL/WINTER 2012

Derecho Causes Widespread Wind Damage

Andy Latto

One of the more memorable severe weather events this summer took place during the afternoon and evening of June 29th. A thunderstorm complex developed during an afternoon of extreme heat and rapidly accelerated southeastward across the Ohio Valley. The characteristics of this storm complex earned it the term *derecho* (pronounced “deh-REY-cho”), a widespread, long-lived wind storm associated with a band of rapidly moving thunderstorms. This derecho caused several hundred wind damage reports across the region as it crossed many state borders over the course of the afternoon and evening. It was the most notable derecho to occur in the United States since 2009, and the National Weather Service office in Wilmington, Ohio issued 19 severe thunderstorm warnings for it. Most of the more than 200 severe weather reports from within NWS Wilmington’s warning area were in relation to strong wind gusts and wind damage, though some isolated large hail was also reported.

A strong ridge of high pressure with near-record high temperatures nosed into the central Ohio Valley on June 29th. Temperatures climbed into the upper 90s to low 100s across the region by early afternoon, creating a very unstable environment. Thunderstorms began to congeal shortly after developing near Chicago, and it was not long before they



started producing widespread damaging winds along their leading edge. Winds gusted as high as 91 mph in northern Indiana just before the derecho moved into NWS Wilmington’s warning area.

The most intense part of the derecho moved southeastward across the area from just north of Dayton to near Columbus at forward speeds of nearly 65 mph. Eight of the ten automated weather observing stations located within NWS Wilmington’s warning area measured severe wind gusts, including 82 mph gusts at the Dayton International and Ohio State University airports. Nearly every one of the 52 counties served by NWS Wilmington, Ohio reported wind damage from this event, and the derecho remained intact and even expanded in length as it departed. Wind damage occurred as far south as central North Carolina and as far north as Pennsylvania before the derecho eventually dissipated as it reached the East Coast late in the evening. Along its path, nearly 5 million people lost power, and a total of 22 people lost their lives during and just after this event, mainly due to falling trees and electrocution from downed power lines. (Continued on page 6)

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A Letter from the Warning Coordination Meteorologist

Dear Skywarn Spotter,

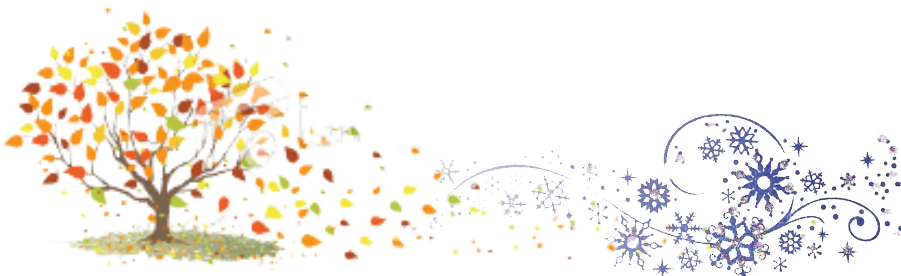
Skywarn spotters, providing reliable real-time severe weather reports, are a vital part of the warning process. In 2012, the National Weather Service in Wilmington, Ohio conducted 45 training sessions (including one advanced spotter training session) for approximately 2,200 spotters. We will be starting the majority of our spotter training sessions for 2013 soon after January 1st. Each volunteer spotter should attend a training session every two to three years. Our program changes from year to year, and there is always something new to learn. Be sure to check our website in the coming months for the latest listing of classes; it will be updated as new classes are scheduled. If you have any questions, please contact our office.

I'd like to extend a thank you to all the Skywarn spotters that have supported our warning program in the past. This includes emergency service personnel, private citizens, and the amateur radio community. Amateur radio operators play a critical role in the Skywarn process and their efforts are greatly appreciated. Special thanks go to those amateur radio operators that function as section net control operators and to the local amateur radio operators that work with us here at the NWS Wilmington office. They activate upon our request, no matter what time of day or night.

This past year has been a busy one with significant weather events ranging from the March 2nd tornado outbreak to the June 29th derecho and the excessive heat and drought of this past summer. Our Skywarn spotters provided valuable weather reports during these events, and we greatly appreciate them.

A number of our staff members contributed to the articles included in this issue, and we hope you find them interesting and informative. You will learn about the tornado outbreak, the derecho, the drought, the dual-polarization radar upgrade at NWS Wilmington, and many other topics. We'd like to hear your ideas for future issues of SkyScoop! You can let us know of your suggestions on Facebook or Twitter, or you can send an email to spotreport.ilm@noaa.gov. We extend a special welcome to any new Skywarn spotters and thank those who continue to work with us as members of the Wilmington Skywarn network. As always, we look forward to seeing you at next year's spotter training classes!

Regards,



Mary Jo Parker

Mary Jo Parker
Warning Coordination Meteorologist
National Weather Service Wilmington, OH
1901 S. State Route 134
Wilmington, OH 45177



Left: The evening weather balloon launch on May 28, 2012, with thunderstorms developing in the background about 10-15 miles south of the office.
Right: Sunrise over NWS Wilmington, Ohio on the morning of July 30, 2012. Photos courtesy of Andy Hatzos and Michael Kurz (NWS employees).

An Unusually Mild Winter

Andrew Snyder

The winter of 2011-2012 left its mark in many people's memories, but it was not for the typical wintertime headaches. On the whole, last winter was very mild with little snowfall. In fact, the National Weather Service in Wilmington, Ohio only issued one Winter Storm Warning during the entire season. What little snow we did receive generally did not remain on the ground long due to frequent stretches of mild temperatures.

However, that is not to say that we didn't have our share of interesting weather. The first snow storm of the season occurred during the overnight hours of November 30th and mainly impacted west-central Ohio, where 2-4 inches of snow fell, with lesser amounts

to the southeast. December featured lots of rain, which helped solidify 2011 as the wettest year on record for many area observation sites. That month alone was the third wettest December on record for Columbus and Dayton and the fourth wettest for Cincinnati.



Playing in 3 to 4 inches of fresh snowfall in St. Marys, Ohio after the January 20-21, 2012 winter storm, one of only a few to impact the region during the entire season. Photo courtesy of Bob Warren.

On January 2nd, winter weather had a significant impact on parts of the area, mainly due to unique circumstances and not the magnitude of the weather system. Light snow fell behind a cold front in an environment of rapidly falling temperatures and gusty winds. Those conditions were favorable for the snow to melt on contact with road surfaces and then refreeze. Combined with rush hour traffic in the Cincinnati area, numerous accidents and road closures resulted.

The biggest winter storm occurred in late January and resulted in the only Winter Storm Warning of the season within NWS Wilmington's forecast area. An area of low pressure tracked northeast through the Tennessee Valley during the overnight

hours of January 20-21 and joined forces with a low pressure system over the Great Lakes to produce precipitation across the Ohio Valley. North of Interstate 70, where a deep Arctic air mass was in place, the precipitation mainly fell as snow (up to 5 inches in spots). Along and south of the Interstate 70 corridor, warmer air aloft caused the precipitation to transition to primarily sleet and freezing rain. Numerous reports of 1/4 inch of icing were received across southwest Ohio and southeast Indiana, including the Cincinnati metro area. Temperatures were warmest across northern Kentucky and south-central Ohio, resulting in only a thin glaze of ice in those areas. Precipitation pulled out of the region by the early morning hours of January 21st. One other notable winter storm affected the region on February 10-11, but most areas received only 1-2 inches of snow from that system.

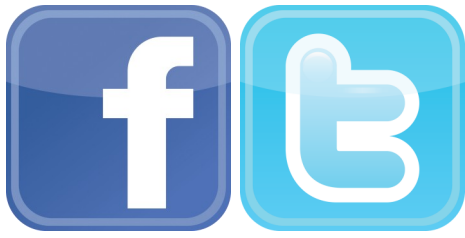
Considering the months of meteorological winter (December, January, and February), the winter of 2011-2012 definitely averaged out much warmer than normal with well below normal snowfall. Columbus had its 7th warmest winter on record, while Cincinnati experienced its 6th least snowiest winter on record (additional statistics provided in the table below). This mild pattern was influenced particularly by a global climatological pattern called the Arctic Oscillation. During its "positive" phase, cold Arctic air is bottled up near the North Pole by the jet stream pattern and thus cannot make intrusions into the Lower 48. That was the case for much of this past winter. What will this winter have in store? Check out the article on page 11 for a climatological preview.

Winter 2011-2012 Summary (December – February)

	Average Temp (°F)	Normal Temp (°F)	Warmest Winter Ranking	# Days Above Normal	# Days Below Normal	Total Snowfall (inches)	Normal Snowfall (inches)	Lowest Snowfall Winter Ranking
Columbus	36.3	31.6	7 th	63	28	11.9	20.9	38 th
Cincinnati	37.5	32.8	13 th	61	25	3.7	17.8	6 th
Dayton	34.1	30.1	17 th (T)	63	26	8.0	18.8	15 th

Using Social Media to Submit Weather Reports

Michael Kurz



“Everybody talks about the weather...” or so the saying goes. That’s no less true in the world of social media, which is a quick and easy way to forward your weather reports, pictures, and videos to us at the National Weather Service. In fact, we WANT you to submit those things to us, because that ground truth information aids us in both issuing and verifying our forecasts and warnings.

Our NWS office in Wilmington, Ohio joined Facebook in September 2011 and Twitter in June 2012. On both of these sites we post forecast and climate information, interesting weather news, science tidbits, and upcoming NWS events. During active weather, we try to provide a “heads up” and highlight important preparedness information. Those are just some of the typical subjects that we cover on social media...so what would we like *you* to share on our Facebook and Twitter pages?

If you have attended one of our spotter training sessions in the past, you should already have an idea of what we’d like you to report to the NWS. This would include things such as: hail (include a size comparison), measured strong wind gusts, trees and large branches blown down, structural wind damage, flooding, and freezing rain. We also appreciate your rainfall totals and snowfall measurements. While we try to actively monitor our social media feeds during periods of active weather, sometimes things get very busy and we must focus our attention elsewhere. Therefore, if you have an **urgent** weather report (such as a funnel cloud or tornado), it is best to give us a call so we receive your report immediately. With any report, don’t forget to include the location and, if possible, the time of the event. And whether you use Facebook or Twitter (or both!), remember that pictures and videos can be worth a thousand words.

On Twitter, you can follow us @NWSILN. Our office serves portions of Ohio, Indiana, and Kentucky, which all have active weather conversations via their state weather hashtag (i.e. #ohwx, #inwx, and #kywx). We check those hashtags from time to time, but they often contain a lot of information from outside our local area. Therefore, we encourage you to send us a tweet directly @NWSILN or use our office hashtag (#ilnwx), which we actively monitor.



NWS Wilmington, Ohio joined Facebook in September 2011. Facebook is a great way to quickly share weather reports, photos, and videos with the NWS.



NWS Wilmington, Ohio joined Twitter in June 2012 and regularly “tweets” interesting weather and climate information. Twitter is an easy way to submit your weather reports and photos to the NWS.

We encourage you to send us a tweet directly @NWSILN or use our office hashtag (#ilnwx), which we actively monitor.

We encourage our Facebook fans and Twitter followers to be involved on our pages! Liking, commenting on, or sharing one of our Facebook posts lets us know that you value the content and would like to see more in the future. Similarly on Twitter, sending us a quick reply, retweeting us, or favoriting one of our tweets also lets us know that you enjoy the content. We would certainly like to see our Facebook fan and Twitter follower numbers continue to grow, so be sure to let your family and friends know about our social media presence.

Studies have shown that individuals often need to receive messages in a number of ways before they decide to take appropriate action. People are more likely to act when they receive information from a trusted source such as a family member, friend, or community leader. So if you see us share critical weather information or a good safety tip, or if you happen to experience severe weather, we encourage you to share it with your social network. Facebook and Twitter make it very simple to quickly share weather information with your family, friends, and the National Weather Service!

Not Your Average Meteorologist

John Franks

Scattered across the nation is a group of 87 incident meteorologists (IMETs) and 25 trainees who are called upon and dispatched at a moment's notice to provide on-site weather support for incidents of national significance. At the National Weather Service office in Wilmington, Ohio, I have served in this capacity for the past decade. I have been to fires in Oregon, Idaho, California, Montana, Georgia, and Florida, and I also provided support for FEMA at the 2004 Republican National Convention in New York.

Events that require IMETs are typically large western wildfires where the Incident Command Structure is employed to effectively organize personnel and equipment from various local, state, and federal agencies. Other events of national significance for which IMETs have been



dispatched include the Columbia space shuttle disaster, large hazardous material spills such as shipwrecks and pipeline failures, and recovery efforts in the wake of large-scale disasters like tornadoes and hurricanes. An exchange program has also been set up with the Australian Bureau of Meteorology.



An IMET conducts a fire weather briefing at an incident command post. Photo courtesy of U.S. Forest Service.

IMETs are ready to dispatch at a moment's notice. They typically have a bag already packed with the basics: a tent, boots, sleeping bag, clothes, toiletries, and other camping essentials. Another bag contains computer and satellite equipment that will be set up on-site. With a quick check of the expected weather conditions (cold camping gear is required in some instances, bug repellent in others), they are ready to travel, set up camp, and begin providing on-site forecasts, sometimes within just a few hours. In my case, the first day usually consists of 18 hours of travel from Ohio, depending on the remoteness of the fire camp.

Fire camp is located within a few miles of the fire so that firefighters can wake up and hit the ground running. This is typically in the middle of nowhere, and diesel generators are run 24/7 to provide electricity, which is all the IMET really needs. Once a satellite connection is made, the IMET will set up the computer and retrieve the data needed to make a forecast. The next step is to get the lay of the land, whether by hiking, driving, or flying, in order to see how the larger weather patterns will be affected locally by terrain. Being in such close proximity to the fire, IMETs have to undergo special training each year in which they review standards for survival and practice deploying fire shelters (a last resort for firefighters when they cannot outrun a fire or get to a safety zone in time).

The workday is long, starting around 4 or 5 AM and ending at 9 or 10 PM. As one would imagine, the work is stressful (both physically and mentally), but for me it is also extremely rewarding. Whether you are at a morning briefing of a few hundred firefighters or in a planning meeting of 10 or 20 people working to keep the front line firefighters safe for their next shift, it is a moment of instant job satisfaction to know that your forecast is helping these people do their jobs safely and effectively.



An incident meteorologist on the front line. Photo courtesy of NOAA/NWS.

Have You Attended an Advanced Spotter Class?

Scott Hickman

It is the goal of the National Weather Service office in Wilmington, Ohio to conduct an advanced spotter class in each of our three population centers of Columbus, Cincinnati, and Dayton once every three years. If you have never attended an advanced spotter class, you might wonder how it differs from the main spotter classes given each year.

NWS Wilmington conducted the 2012 advanced spotter class in Columbus this past spring. It began with a quick overview of important topics covered during a usual spotter training session. Next the instructors went into further detail on the science behind severe storm forecasting and detection. This included an explanation of how meteorologists perform detailed mesoscale analysis to anticipate storm type, development, and decay (the term *mesoscale* refers to the horizontal size of weather phenomena—in this case, thunderstorms and squall lines). With this background knowledge, the attendees were ready to delve into detailed analysis of storm structure and spotting techniques.

"Thanks to the great professionals at the Wilmington Weather Service for an awesome spotter class -- very informative and fun. I learned a lot."

- Danny R.



A National Weather Service meteorologist speaks about Doppler radar at the 2012 advanced spotter class in Columbus. Photo courtesy of Andy Hatzos (NWS employee).

Meteorologists also presented some of the science behind radar technology with a special emphasis on the new NWS dual-polarization radar technology (see the dual pol article on page 8 for more information). Spotters were then given the opportunity to tie all of this supplemental information together through a detailed case study of a significant severe storm event that took place in our area. Before the class concluded, contestants were chosen to play a fun and educational game of "Who Wants to Be a Meteorologist?" in which spotters were placed in the hot seat to test their new knowledge as a severe weather event unfolded.

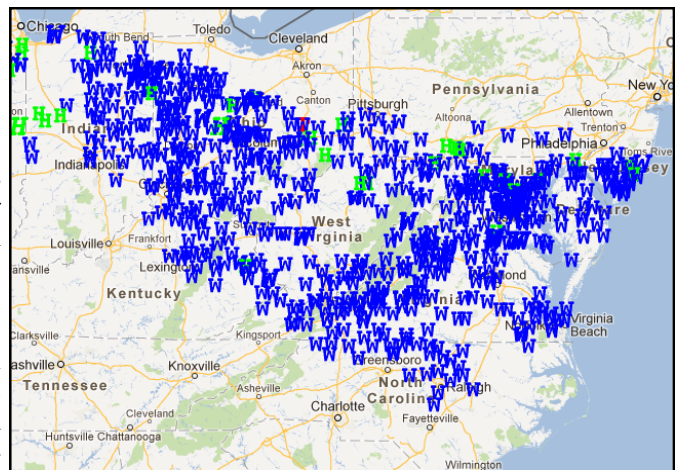
Our advanced spotter class tends to be a very popular event. In fact, over 200 people attended the Columbus class this year. If you would like to learn more about the whys and hows of severe weather, then this class is for you! The next advanced spotter class is expected to be held in the Cincinnati area this coming spring. We hope to see you there!

Derecho

(continued from page 1)

Although no direct fatalities were reported in NWS Wilmington, Ohio's warning area, there were some injuries reported. A stage collapse resulted in injuries at Wright Patterson Air Force Base, and an injury was also reported at the Kentucky Motor Speedway. Other injuries were caused by trees and power poles falling onto vehicles. Four indirect heat-related fatalities occurred in the days following the derecho due to the combination of prolonged power outages caused by the massive storm and the ongoing heat wave in the area.

The June 29, 2012 derecho traveled approximately 700 miles in 12 hours and captured widespread media attention as it swept through a heavily populated corridor from near Chicago and Indianapolis all the way to the nation's capital. It was the most widespread damaging wind event to impact NWS Wilmington, Ohio's warning area since the office opened in 1994. Its effects lingered long after the storms had ended, as millions were left without power during a subsequent heat wave with triple-digit high temperatures.



Map showing the incredible swath of wind damage reports associated with the derecho, stretching from near Chicago to the East Coast. Image courtesy of NWS/Storm Prediction Center.

The March 2, 2012 Tornado Outbreak

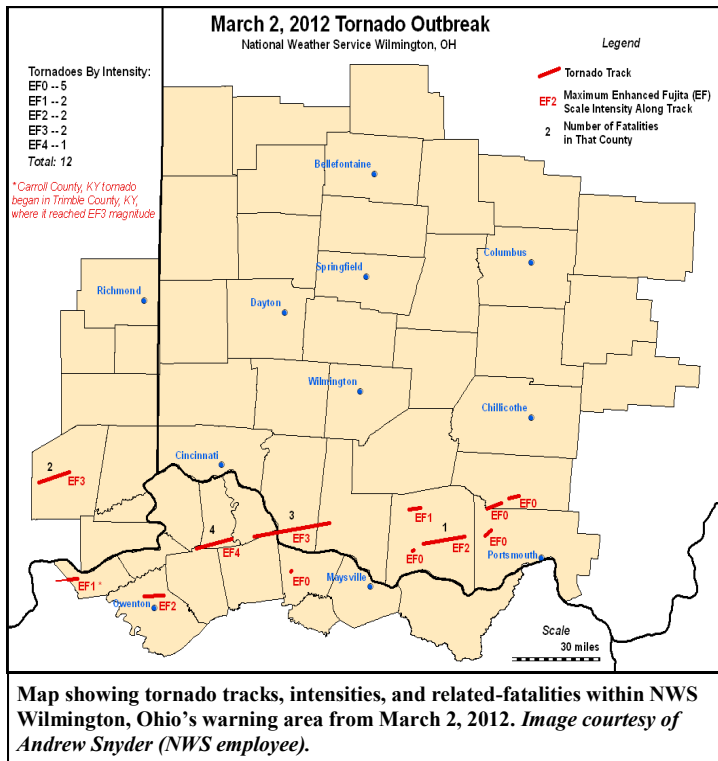
Andy Hatzos

A deadly tornado outbreak occurred on March 2, 2012, stretching from the Ohio Valley to the Deep South. This late-winter severe event was the most prolific tornado outbreak in the 18-year history of the NWS office in Wilmington, Ohio, and it was the first event for which the office issued “tornado emergency” statements and warnings.

A strengthening area of low pressure moved northeast from the Mississippi Valley into the central Great Lakes, allowing a warm front to reach north of the Ohio River. Along and south of the front, temperatures were well above normal, leading to instability that helped fuel the thunderstorms. Very strong wind shear combined with these other factors to produce an environment highly favorable for tornadic development. The Storm Prediction Center in Norman, Oklahoma issued a rare “high risk” outlook of severe thunderstorms for the Louisville and Cincinnati metropolitan areas.

Between 3:30 PM and 6 PM, a total of 12 tornadoes developed across the NWS Wilmington forecast area, affecting areas within one or two counties of the Ohio River. The tornadoes ranged in strength from EF0 to EF4 on the Enhanced Fujita Scale. Eleven of the tornadoes developed from a pair of long-track supercell thunderstorms. These storms progressed from southwest Indiana through southern Ohio, producing near-constant tornadoes (including the Henryville, Indiana EF4) and hail up to the size of softballs.

Of these two supercells, the northern one prompted the first “tornado emergency” ever issued by NWS Wilmington and spawned the most significant tornado of the day within the office’s warning area. This tornado occurred in Grant and Kenton counties in Kentucky, just 20 miles south of downtown Cincinnati and the Ohio River.

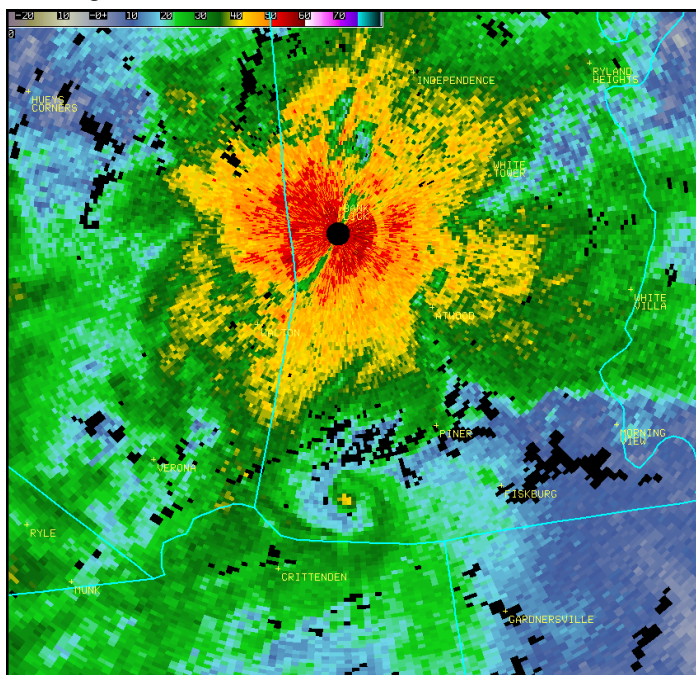


With its most severe damage rated at the EF4 level, the tornado tracked ten miles and caused four fatalities within an area of near-complete destruction between Crittenden and Piner, Kentucky. Five homes were completely demolished to their foundations. It was the first EF4 in the NWS Wilmington, Ohio warning area since the one that struck Xenia, Ohio on September 20, 2000.

The Crittenden-Piner EF4 tornado passed within six miles of the Terminal Doppler Weather Radar (TDWR) in Walton, Kentucky, allowing the radar to capture breathtaking details of the storm at a degree that was unprecedented for NWS Wilmington. The TDWR data clearly depicted a well-defined hook echo as well as a debris ball signature—a direct representation of debris being lofted by the tornado. In addition, the TDWR showed the tornado’s weakening and dissipation within Kenton County and its eventual development into a new tornado just minutes later.

This new tornado, an EF3, would end up being the longest-track tornado of the day for NWS Wilmington, Ohio. First impacting Peach Grove, Kentucky, the tornado crossed the Ohio River and registered a direct hit on the village of Moscow, Ohio. Homes near the river were decimated, and an

(Continued on page 9)



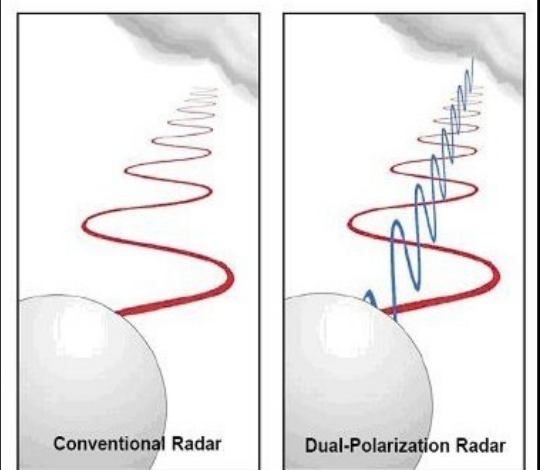
NWS Wilmington Receives Dual-Polarization Upgrade

Seth Binau

From August 23-28, 2012, the Warning Surveillance Radar-1988D (WSR-88D) located at the National Weather Service office in Wilmington, OH (KILN) received its greatest technological upgrade since its deployment in 1994. That advancement, called *dual polarization* or simply *dual pol*, ushered in a new and exciting period in radar meteorology for the NWS and all users of Doppler radar data nationwide. A total of 122 WSR-88Ds across the country (including those owned by the NWS, the Federal Aviation Administration, and the Department of Defense) will receive the upgrade by the middle of 2013, bringing the two-year nationwide deployment period to a close.

What is Dual Polarization?

Until the upgrade, the KILN radar was a single-polarization radar, meaning each radar pulse was sent only in a horizontal orientation. With the recent upgrade, hardware and software was added to the radar for transmitting and receiving a *vertically*-oriented pulse in addition to the horizontally-oriented pulse. This allows the radar to “see” targets in two dimensions via two separate channels—horizontal and vertical. The ratio of how these targets are sampled by the two pulses is processed by complex algorithms that give meteorologists extra information about the size and shape of the targets, characteristics that were previously undetected.



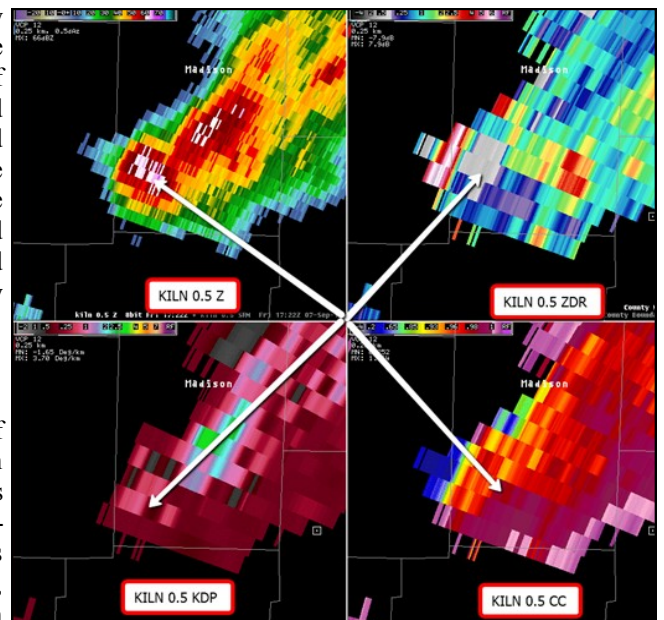
Dual-polarization technology incorporates a vertically-oriented pulse of energy in addition to the conventional horizontally-oriented pulse of energy. *Image courtesy of NOAA/NWS.*



KILN radar just a couple days before it was taken offline for dual-polarization upgrade work to begin. *Photo courtesy of Michael Kurz (NWS employee).*

The Procedure

An installation team took the Wilmington, Ohio WSR-88D out of service on the afternoon of August 23rd and began the process of adding the necessary components to send and receive the two pulses. There was no removal of the protective dome surrounding the radar antenna; anyone driving by would never know this work was being performed inside. Workers hoisted the new parts via a pulley system up nearly 100 feet to the base of the dome, where a hatch in the floor allowed them to bring the new hardware inside. The entire process of adding the new feed horn, transmitter, and processing software took just shy of five days to complete, and the radar was returned to service operationally on August 28th.



Some of the new dual-pol products, including differential reflectivity (ZDR, top-right), correlation coefficient (CC, bottom-right), and specific differential phase (KDP, bottom-left). This is a large hail core from a storm on Sept. 7, 2012 as seen by the KILN WSR-88D. *Photo courtesy of NOAA/NWS.*

Dual-Pol Products

The upgrade to dual-polarization technology brings a wealth of new radar products to meteorologists across the country. The main benefits will be increased confidence in the *type* of target the radar is sampling, whether meteorological (hail, rain, snow, etc.) or non-meteorological (bugs, dust, birds, etc.). For example, meteorologists will be more confident in identifying thunderstorms that contain hail, areas where rain has transitioned to snow, locations where heavy rain rates may lead to flash flooding, and even when a tornado lofts debris! We at NWS Wilmington, Ohio have undergone a significant amount of training in preparation for using dual-pol radar technology, and we are excited to put the new data to use!

Summer 2012 Finishes Hot and Dry

Michael Kurz

After a mild winter and the warmest spring on record across the region, many wondered what summer 2012 would have in store for the Ohio Valley. In terms of overall average temperatures from June through August, this past summer finished about 2 to 3 degrees above normal and was comparable to both 2011 and 2010. However, in terms of the sheer number of days reaching 90 degrees or higher, this past summer was one of the hottest in recent decades. There were even a handful of days with temperatures soaring above 100 degrees—the most in this area since 1988. Summer 2012 finished as the 3rd warmest summer on record for Columbus, the 12th warmest for Dayton, and the 18th warmest for Cincinnati.

While each month saw several heat waves, July in particular finished several degrees above normal. In fact, it was the warmest July on record for Columbus, the 4th warmest for Dayton, and the 6th warmest for Cincinnati. June and August both had periods of below normal temperatures, and that had a dampening effect on the overall average temperature for the summer.

The other main story this summer was the persistent drought across the region, especially over the western portions of NWS Wilmington, Ohio's forecast area. Thunderstorms were hit-or-miss for much of the summer, so some areas received beneficial rainfall while others were not so lucky. Summer precipitation deficits generally ranged from 4 to 6 inches across southeast Indiana, west-central Ohio, and northern Kentucky. Precipitation deficits were slightly better across central Ohio and northeast Kentucky. Overall, it was the 7th driest summer on record for both Cincinnati and Dayton and the 11th driest for Columbus.

Summer 2012 Summary (June – August)

	Average Temp (°F)	Normal Temp (°F)	# Days Reaching 90° or Higher	# Days Reaching 100° or Higher	Total Rainfall (inches)	Normal Rainfall (inches)
Columbus	76.4°	73.5°	44	4	6.35	12.12
Cincinnati	76.7°	74.3°	40	6	4.89	11.20
Dayton	75.1°	72.5°	34	3	6.08	11.27

(Continued on page 11)

Tornado Outbreak

(continued from page 7)

aerial damage survey confirmed that nearly every structure in the village was damaged. The tornado dissipated near Hamersville, Ohio after producing a 23-mile path of destruction. The twin supercells produced several more tornadoes, including an 11-mile EF2 that caused significant damage northeast of West Union, Ohio.

The only tornado not associated with the long-track supercells was a rapidly-developing EF3 in western Ripley County, Indiana. This tornado developed from a small supercell that moved out of Jennings County and quickly strengthened as it struck the town of Holton, Indiana. Two lives were lost in Holton, and numerous homes were destroyed. The tornado gradually weakened as it ended its 9-mile path south-east of Osgood, Indiana.

Nationwide, the March 2-3, 2012 severe weather outbreak produced 70 confirmed tornadoes and resulted in at least 40 deaths.



Situated along the Ohio River, the village of Moscow, Ohio was devastated by an EF3 tornado, as seen in this photograph taken during an aerial damage survey the following day. Photo courtesy of Andy Hatzos (NWS employee).

The More Subtle Considerations of Drought Formation

Julie Dian-Reed

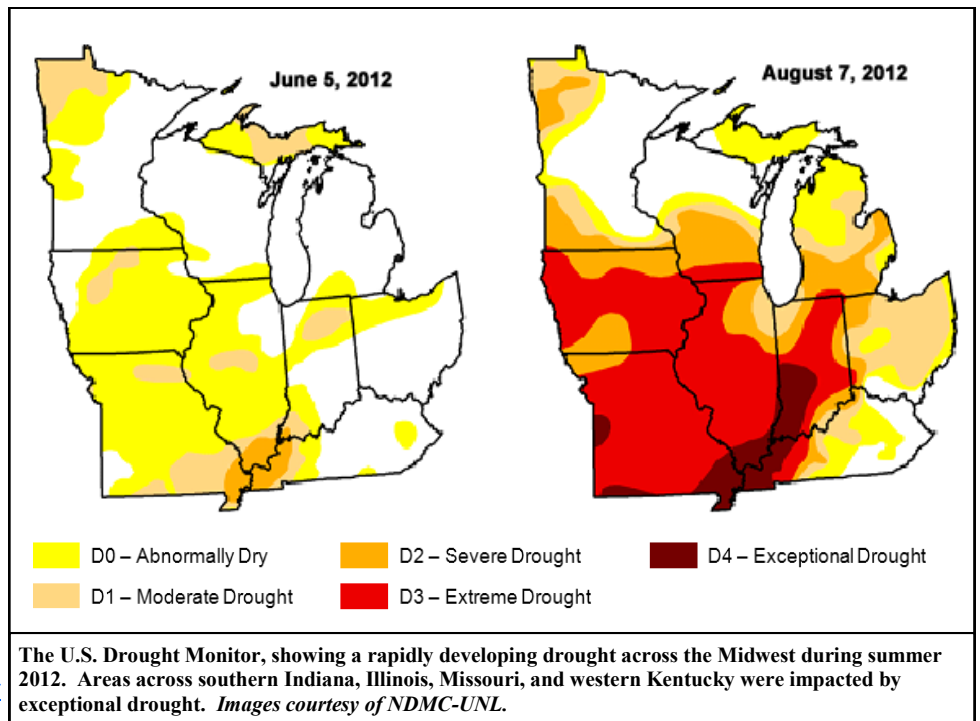
To get a better picture of the evolution of the 2012 growing season and drought, the long-term meteorological conditions need to be examined. This especially applies when attempting to compare a “drought year” with a drought of the past.

It should be noted first that determination of a drought is much more complex than simply examining long-term precipitation and temperature patterns. Oftentimes there are factors other than meteorological conditions that come into play, such as water shortages. For example, much of western Ohio’s water supply comes from the Great Miami Aquifer. That area is therefore less vulnerable to water restrictions than those areas without an ample underground water source. Changes in land use and population density over time can also affect the overall demand for water in an area, which can make comparisons between drought years more complicated.

True *extreme* or *exceptional* drought conditions are uncommon, but they did occur across much of the central United States in 2012. The year began with an extremely mild winter for the Ohio Valley, followed by the warmest March on record for Cincinnati, Columbus, and Dayton. This record warmth prompted an early agricultural growing season across the area. It was reported by some county extension agents that farmers who were able to take advantage of early planting due to the warm and wet spring conditions actually suffered less drought damage than those who planted later, as their crops were less vulnerable to prolonged hot and dry conditions during the summer.

Oftentimes the weather conditions leading up to extended periods of dry conditions play a significant role in the development of a drought. Historic droughts have typically been marked by subtle long-term dryness preceding a hot and dry growing season (as was the case during the 1930s Dust Bowl, as well as in 1988). It often goes unrecognized that one of the main contributing factors to the extreme drought of 1988 was a long-term dryness that began in 1987. In fact, 1987 as a whole was actually a drier year than 1988 for nearly all the climate and cooperative observing stations within NWS Wilmington Ohio’s forecast area. That dryness resulted in soil moisture deficits leading into the 1988 growing season, but that was not the case in 2012. Going into the 2012 growing season, soil moisture was high due to 2011 being the wettest year on record in many locations. Thus, what made the 2012 drought unique was how rapidly it developed.

One similarity between the 2012 and 1988 droughts was where they were geographically centered. During both of these drought years, the worst of the combined extreme temperatures and prolonged dryness was in the Midwest, particularly in Iowa, Illinois, Missouri, Indiana, and portions of neighboring states. In the U.S. Drought Monitor depictions to the right (for a clear description of the different drought severity classifications, visit the [U.S. Drought Monitor website](http://www.srh.noaa.gov/mst/monitoring/USDM.php)), the worst of the 2012

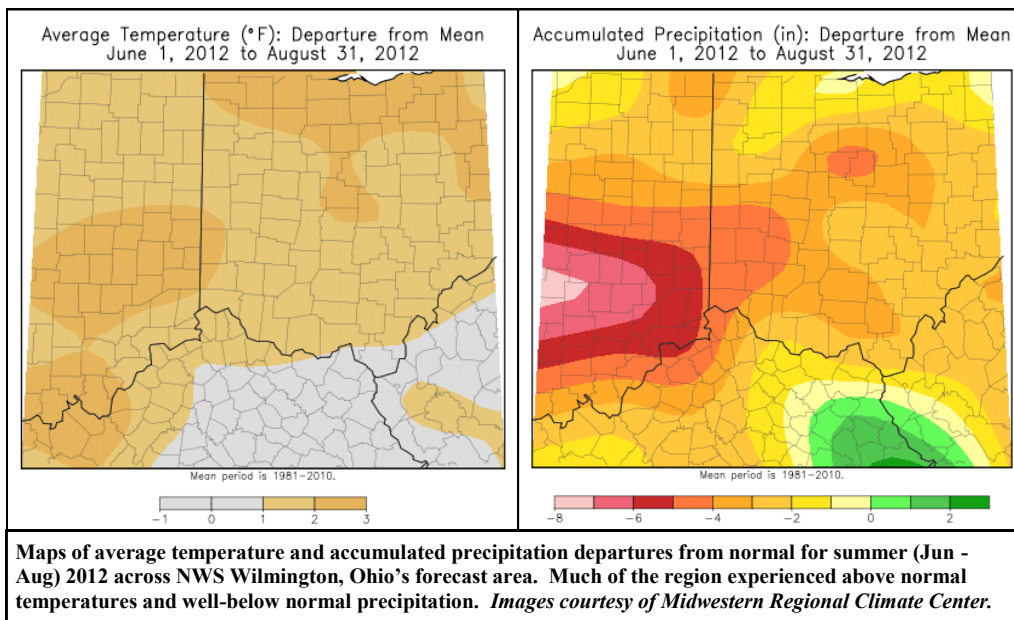


drought was “centered” over southern Indiana, Illinois, Missouri, and western Kentucky. As with many past droughts, the drought of 2012 expanded from this central location to encompass much of the central U.S.

While the drought of 2012 resulted in crop loss and livestock stress across much of the central U.S., it is difficult to compare it to the drought of 1988. Conditions during the 2012 growing season (see the summer 2012 summary article in this issue) resulted in a fast-developing drought that peaked in mid to late summer. While the severe drought conditions have since waned across our area, substantial long-term precipitation deficits do remain across portions of the Miami Valley and central Ohio. This lingering dryness will need to be monitored going into the 2013 growing season.

Summer 2012

(continued from page 9)



Of course, the hot and dry conditions this summer were not just confined to the central Ohio Valley. According to NOAA's National Climatic Data Center (NCDC), this summer was the 3rd warmest and 18th driest summer on record for the Lower 48 since recordkeeping began in 1895. Only the summers of 2011 and 1936 had higher average temperatures. While the heat-waves this summer were not quite as intense as those of 2011, they impacted more of the population. According to NCDC, more than 80 million people (about 10 million more than in 2011) experienced triple digit heat this summer.

Winter 2012-2013 Outlook

Andrew Snyder

NOAA's Climate Prediction Center (CPC) recently released their outlook for the upcoming winter. As seen in the maps to the right, much of the Ohio Valley is located in an area of "equal chances" for both temperature and precipitation, although chances for above normal precipitation increase south of the Ohio River (based on climate computer predictions). It is important to note the "equal chances" designation does *not* mean that the outlook is calling for a "normal" winter. Rather, it means there are equal chances (33.3% each) for temperatures and precipitation to be either above, below, or near normal.

The CPC said this winter's outlook was especially challenging since there have been mixed signals from the El Niño-Southern Oscillation (ENSO). Initially, warming ocean waters in the eastern equatorial Pacific Ocean suggested that an El Niño phase may have been developing, but this warming has since stalled. A few climate models still predict a weak El Niño, though most call for ENSO-neutral conditions (near normal ocean temperatures). A strong signal from ENSO can be one of the major determining factors of a seasonal climate outlook. Thus, having a weak or neutral ENSO means that other factors could play more important roles in determining how this winter will unfold.

Several of these global patterns, namely the North Atlantic Oscillation (NAO) and Arctic Oscillation (AO), are somewhat complex to discuss in this brief article but can be critical for weather patterns on the East Coast. The "phase" of these patterns determines whether Arctic air will be able to surge southward or will be bottled up near the North Pole. Most of these patterns can be forecast with skill only a couple weeks in advance, which is why the lack of any clear-cut signals for this winter led to the "equal chances" forecast. While this leaves the winter forecast in a sort of "wait and see" limbo, we can use statistics and climatology to say that odds are this winter will be somewhere in between the extremes.

